▶ Part 1: Arithmetic Reasoning

Time: 36 minutes

1. What is the estimated product when 157 and 817 are rounded to the nearest hundred and multiplied?
  a. 160,000
  b. 180,000
  c. 16,000
  d. 80,000

2. A large coffee pot holds 120 cups. It is about two-thirds full. About how many cups are in the pot?
  a. 40 cups
  b. 80 cups
  c. 60 cups
  d. 90 cups

3. Mr. Tupper is purchasing gifts for his family. He stops to consider what else he has to buy. A quick mental inventory of his shopping bag so far reveals the following:

1 cashmere sweater, valued at	$260
3 diamond bracelets, each valued at	$365
1 computer game, valued at	$78
1 cameo brooch, valued at	$130

  Later, having coffee in the Food Court, he suddenly remembers that he has purchased only two diamond bracelets, not three, and that the cashmere sweater was on sale for $245. What is the total value of the gifts Mr. Tupper has purchased so far?
  a. $833
  b. $1,183
  c. $1,198
  d. $1,563

This is a list of ingredients needed to make 16 brownies. Use this list to answer questions 4 and 5.

Deluxe Brownies
$\frac{2}{3}$ cup butter
5 squares (1 ounce each) unsweetened chocolate
$1\frac{1}{2}$ cups sugar
2 teaspoons vanilla
2 eggs
1 cup flour

4. How much sugar is needed to make 8 brownies?
  a. $\frac{3}{4}$ cup
  b. 3 cups
  c. $\frac{2}{3}$ cup
  d. $\frac{5}{8}$ cup

5. What is the greatest number of brownies that can be made if the baker has only one cup of butter?
  a. 12
  b. 16
  c. 24
  d. 32

6. An outdoor swimming pool at the Shulkind residence can be filled with water from the garden hose at a rate of three and a half inches per hour. If the Shulkinds want to fill the empty pool with 49 inches of water, how many hours will it take to get to this level?
  a. 3.5 hours
  b. 5.25 hours
  c. 14 hours
  d. 16.3 hours

Part 1: Arithmetic Reasoning Answers

1. **a.** 157 is rounded to 200; 817 is rounded to 800; $(200)(800) = 160{,}000$.

2. **b.** Multiply 120 by $\frac{2}{3}$. Thus, $\frac{120}{1} \times \frac{2}{3} = \frac{240}{3} = 80$; 120 is written as a fraction with a denominator of 1. The fraction $\frac{240}{3}$ is simplified by dividing 240 by 3 to get 80 cups.

3. **b.** Add the corrected value of the sweater ($245) to the value of the two, not three, bracelets ($730), plus the other two items ($78 and $130).

4. **a.** The recipe is for 16 brownies. Half of that, 8, would reduce the ingredients by half. Half of $1\frac{1}{2}$ cups of sugar is $\frac{3}{4}$ cup.

5. **c.** The recipe for 16 brownies calls for $\frac{2}{3}$ cup butter. An additional $\frac{1}{3}$ cup would make 8 more brownies, for a total of 24 brownies.

6. **c.** Since the Shulkinds want 49 inches of water and they can get only $3\frac{1}{2}$ inches of water per hour, you must divide 49 inches by $3\frac{1}{2}$ inches to see how many hours that will take.

   - $\frac{49}{1} \div 3\frac{1}{2}$
   - $\frac{49}{1} \div \frac{7}{2}$
   - $\frac{49}{1} \times \frac{2}{7}$
   - Reduce diagonally to get $\frac{7}{1} \times \frac{2}{1}$.
   - 14 hours is the answer.

7. The state of Connecticut will pay two-fifths of the cost of a new school building. If the city of New Haven is building a school that will cost a total of $15,500,000, what will the state pay?
a. $3,100,000
b. $7,750,000
c. $6,200,000
d. $4,550,000

8. Body mass index (BMI) is equal to $\frac{\text{weight in kilograms}}{(\text{height in meters})^2}$. A man who weighs 64.8 kilograms has a BMI of 20. How tall is he?
a. 1.8 meters
b. 0.9 meters
c. 2.16 meters
d. 3.24 meters

9. Maya is using written instructions to create an airplane made out of thin balsa wood. Her instructions are drawn to scale so that every $\frac{1}{8}$ inch in the drawing represents $1\frac{1}{2}$ inches of balsa wood. How tall will the tail of the airplane be if it is $2\frac{3}{4}$ inches tall in the drawing?
a. 12 inches
b. 22 inches
c. 26 inches
d. 33 inches

10. Newly hired nurses have to buy duty shoes at the full price of $84.50, but nurses who have served at least a year get a 15% discount. Nurses who have served at least three years get an additional 10% off the discounted price. How much does a nurse who has served at least three years have to pay for shoes?
a. $63.78
b. $64.65
c. $71.83
d. $72.05

11. Katie has a drawer of unmarked spare keys for the dorm that she manages. If the drawer contains 9 keys to the front door, 4 keys to the laundry room, and 3 keys to the storage closet, what is the probability that when she grabs a key at random, it will be a key to either the front door or the storage closet?
a. 75%
b. 56.25%
c. 43.75%
d. 25%

12. The basal metabolic rate (BMR) is the rate at which our body uses calories. The BMR for a man in his twenties is about 1,700 calories per day. If 204 of those calories should come from protein, about what percent of this man's diet should be protein?
a. 1.2%
b. 8.3%
c. 12%
d. 16%

13. The condition known as Down syndrome occurs in about one in 1,500 children when the mothers are in their twenties. About what percent of all children born to mothers in their twenties are likely to have Down syndrome?
a. 0.0067%
b. 0.67%
c. 6.7%
d. 0.067%

14. If a population of yeast cells grows from 10 to 320 in a period of five hours, what is the rate of growth?
a. It doubles its numbers every hour.
b. It triples its numbers every hour.
c. It doubles its numbers every two hours.
d. It triples its numbers every two hours.

7. **c.** Multiply \$15,500,000 by $\frac{2}{5}$; $\frac{15,500,000}{1} \times \frac{2}{5} =$ \$6,200,000

8. **a.** Substituting known quantities into the formula yields $20 = \frac{64.8}{x^2}$. Next, you must multiply through by x^2 to get $20x^2 = 64.8$. Now divide through by 20 to get $x^2 = \frac{64.8}{20} = 3.24$. Now take the square root of both sides to get x equals 1.8.

9. **d.** You must first divide $2\frac{3}{4}$ inches by $\frac{1}{8}$ inches to see how many $\frac{1}{8}$-inch segments are in $2\frac{3}{4}$.

- $2\frac{3}{4} \div \frac{1}{8}$

- $\frac{11}{4} \div \frac{1}{8}$

- $\frac{11}{4} \times \frac{8}{1}$

- Reduce diagonally to get $\frac{11}{1} \times \frac{2}{1}$.

- $\frac{11}{1} \times \frac{2}{1} = 22$

There are 22 $\frac{1}{8}$-inch segments in $2\frac{3}{4}$ inches. Since each segment represents $1\frac{1}{2}$ inches, multiply $1\frac{1}{2}$ by 22 to see how many inches tall the tail will be.

- $\frac{3}{2} \times 22 = 33$ inches

10. **b.** You can't just take 25% off the original price, because the 10% discount after three years of service is taken off the price that has already been reduced by 15%. Solve the problem in two steps: after the 15% discount the price is \$71.83. Ninety percent of that—subtracting 10%—is \$64.65.

11. **a.** There are 16 keys in total $(9 + 4 + 3 = 16)$. Since 12 of those keys are to the front door or the storage closet, the probability of grabbing one of those keys at random is $\frac{12}{16} = \frac{3}{4} =$ 75%.

12. **c.** The problem is solved by dividing 204 by 1,700. The answer, 0.12, is then converted to a percentage.

13. **d.** The simplest way to solve this problem is to divide 1 by 1,500, which is 0.0006667, and then count off two decimal places to arrive at the percentage, which is 0.06667%. Since the question asks *about what percentage*, the nearest value is 0.067%.

14. **a.** You can use trial and error to arrive at a solution to this problem. After the first hour, the number would be 20, after the second hour 40, after the third hour 80, after the fourth hour 160, and after the fifth hour 320. The other answer choices do not have the same outcome.

15. How much water must be added to 1 liter of a 5% saline solution to get a 2% saline solution?
a. 1L
b. 1.5 L
c. 2 L
d. 2.5 L

16. Susan and Bill are training for a marathon together. They were given instructions to run for 52 minutes on Friday, and increase their run time by 10% every Friday. If their first Friday run is 52 minutes, approximately how many minutes will their third Friday run last?
a. 60 minutes
b. 63 minutes
c. 67 minutes
d. 72 minutes

17. All of the rooms in a building are rectangular, with 8-foot ceilings. One room is 9 feet wide by 11 feet long. What is the combined area of the four walls, including doors and windows?
a. 99 square feet
b. 160 square feet
c. 320 square feet
d. 72 square feet

18. What is the volume of a pyramid that has a rectangular base of 10 inches by 12 inches and a height of 10 inches? ($V = \frac{1}{3}lwh$)
a. 40 cubic inches
b. 320 cubic inches
c. 400 cubic inches
d. 1,200 cubic inches

19. A child has a temperature of 40° C. What is the child's temperature in degrees Fahrenheit? ($F = \frac{9}{5}C + 32$)
a. 101° F
b. 102° F
c. 103° F
d. 104° F

20. If jogging for one mile uses 150 calories and brisk walking for one mile uses 100 calories, a jogger has to go how many times as far as a walker to use the same number of calories?
a. $\frac{1}{2}$
b. $\frac{2}{3}$
c. $\frac{3}{2}$
d. 2

21. A dosage of a certain medication is 12 cc per 100 pounds. What is the dosage for a patient who weighs 175 pounds?
a. 15 cc
b. 18 cc
c. 21 cc
d. 24 cc

22. A hiker walks 40 miles on the first day of a five-day trip. On each day after that, he can walk only half as far as he did the day before. On average, how far does he walk each day?
a. 10 miles
b. 15.5 miles
c. 20 miles
d. 24 miles

23. Mr. Thaler is driving from Los Angeles to San Francisco. If he drives 3 hours in traffic at an average speed of 32 miles an hour, and then 4.5 hours on the freeway, at an average speed of 72 miles per hour, what was his overall average speed on his trip to San Francisco?
a. 45 miles per hour
b. 52 miles per hour
c. 56 miles per hour
d. 60 miles per hour

15. **b.** Use the equation $.05(1) = .02(x)$, where x is the total amount of water in the resulting 2% solution. Solving for x, you get 2.5. Subtracting the 1 liter of water already present in the 5% solution, you will find that 1.5 liters need to be added.

16. **b.** The second week's run will increase by 10% of 52:

- $10\% \times 52 = 0.10 \times 52 = 5.2$ minutes (this will be the increase in minutes)
- $52 + 5.2 = 57.2$ minutes. This will be how long their *second* Friday run will last Then the third Friday run will increase by another 10%:
- $10\% \times 57.2 = 0.10 \times 57.2 = 5.72$ minutes (this will be the increase in minutes)
- $57.2 + 5.72 = 62.93$ minutes.
- So their run on their third Friday will last for approximately 63 minutes.

17. **c.** Each 9-foot wall has an area of 9(8) or 72 square feet. There are two such walls, so those two walls combined have an area of 144 square feet. Each 11-foot wall has an area of 11(8) or 88 square feet, and again there are two such walls: 88 (2) = 176. Finally, add 144 and 176 to get 320 square feet.

18. **c.** Using the formula, $V = \frac{1}{3}(10)(12)(10)$.

19. **d.** Substituting 40 for C in the equation yields F $= (\frac{9}{5})(40) + 32 = 72 + 32 = 104$.

20. **b.** $150x = (100)(1)$, where x is the part of a mile a jogger has to go to burn the calories a walker burns in 1 mile. If you divide both sides of this equation by 150, you get $x = \frac{100}{150}$. Cancel 50 from both the numerator and denominator to get $\frac{2}{3}$. This means that a jogger has to jog only $\frac{2}{3}$ of a mile to burn the same number of calories a walker burns in a mile of brisk walking.

21. **c.** The ratio is $\frac{12 \text{ cc}}{100 \text{ pounds}} = \frac{x}{175 \text{ pounds,}}$ where x is the number of cc's per 175 pounds. Multiply both sides by 175 to get $(175)(\frac{12}{100})$ equals x, so x equals 21.

22. **b.** On the first day, the hiker walks 40 miles. On the second day, he walks 20 miles. On the third day, he walks 10 miles. On the fourth day, he walks 5 miles. On the fifth day, he walks 2.5 miles. The sum of the miles walked, then, is 77.5 miles. The average over 5 days is 77.5 divided by 5, or 15.5 miles per day.

23. **c.** This is a weighted average problem. To find the average speed, use the formula:

average speed (in miles per hour) = $\frac{\text{total miles driven}}{\text{total hours driven}}$

- $3 \text{ hr} \times 32 \text{ mph} = 96$ miles driven at slow speeds. $4.5 \text{ hr} \times 72 \text{ mph} = 324$ miles driven at highway speeds. The total distance driven is 420 miles in 7.5 hours.
- $\frac{420 \text{ miles}}{7.5 \text{ hours}} = 56$ miles per hour

24. A family's gas and electricity bill averages $80 a month for seven months of the year and $20 a month the rest of the year. If the family's bills were averaged over the entire year, what would the monthly bill be?
   a. $45
   b. $50
   c. $55
   d. $60

25. Jason is six times as old as Kate. In two years, Jason will be twice as old as Kate is then. How old is Jason now?
   a. 3 years old
   b. 6 years old
   c. 9 years old
   d. 12 years old

26. During her first three months at college, a student's long distance phone bills are $103.30, $71.60, and $84.00. Her local phone bill is $18.00 each month. What is her average total monthly phone bill?
   a. $86.30
   b. $92.30
   c. $98.30
   d. $104.30

27. A Boeing 747 airplane burns approximately 1 gallon of fuel for every second flown. If the flight from New York to Beijing is 13.5 hours, approximately how many gallons of fuel will be used during this trip?
   a. 10,084 gallons
   b. 810 gallons
   c. 48,600 gallons
   d. cannot be determined with the information given

28. Land in a development is selling for $60,000 per acre. If Jack purchases $1\frac{3}{4}$ acres, how much will he pay?
   a. $45,000
   b. $135,000
   c. $105,000
   d. $120,000

29. For every dollar Kyra saves, her employer contributes a dime to her savings, with a maximum employer contribution of $10 per month. If Kyra saves $60 in January, $130 in March, and $70 in April, how much will she have in savings at the end of that time?
   a. $270
   b. $283
   c. $286
   d. $290

30. Jackie is paid $822.40 twice a month. If she saves $150.00 per paycheck and pays $84.71 on her student loan each month, how much does she have left to spend each month?
   a. $1,175.38
   b. $1,260.09
   c. $1,410.09
   d. $1,560.09

▶ Part 2: Word Knowledge

Time: 11 minutes

Select the choice that best matches the underlined word.

1. According to the code of conduct, "Every officer will be <u>accountable</u> for his or her decisions."

Answers

24. **c.** $80 per month times 7 months is $560. $20 per month times the remaining 5 months is $100. $560 plus $100 equals $660 for the entire year. $660 divided by 12 months is $55.

25. **a.** $J = 6K$; $J + 2 = 2(K + 2)$, so $6K + 2 = 2K + 4$, which means K equals $\frac{1}{2}$. J equals $6K$, or 3.

26. **d.** Add each monthly bill plus $54 for total local service to get $312.90 for three months. Dividing by 3 gives an average of $104.30.

27. **c.** Change 13.5 hours into minutes by multiplying by 60: $13.5 \times 60 = 810$ minutes. Then change 810 minutes into seconds by multiplying by 60 again: $810 \times 60 = 48{,}600$ seconds. 48,600 seconds between the two cities means 48,600 gallons used.

28. **c.** Multiply the cost per acre by the number of acres; $60{,}000 \times 1\frac{3}{4}$.

29. **b.** Kyra saves $60 + $130 + $70 = $260. In January, her employer contributes $6 and in April, $7. In March, her employer contributes only $10, the maximum amount. The total in savings is $260 + $6 + $7 + $10 = $283.

30. **b.** Jackie is paid and saves twice a month, while she pays her student loan only once a month. Her monthly salary is $1,644.80. Subtract $300 in savings and $84.71 for the student loan to get $1,260.09.